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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/785,502 02/20/01 NAGANO

Y 740819-501

022204
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MMC2/1002

EXAMINER

WOJCIECHOWICZ, E

ART UNIT

PAPER NUMBER

2815

DATE MAILED:

10/02/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary

Application No.

09/785,502

Applicant(s)

Nagano et al

Examiner

Edward Wojciechowicz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).
- a) ☐ All b) ☐ Some* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- *See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892) 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 19) ☐ Notice of Informal Patent Application (PTO-152)
- 17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 20) ☐ Other:

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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onishi et al, and further in view of Jiang et al. Applicants' inventive concept lies in the formation of a multi-layer barrier film which is formed as part of a lower capacitor electrode overlying a contact plug. The first barrier film serves to prevent the migration of material from the plug into the capacitor film, while the second barrier layer is to prevent the diffusion of unwanted oxygen.

Onishi shows a similar structure to the claimed invention with a Fig. 1 configuration directly analogous to applicants' Fig. 1 embodiment. For example, Onishi shows a lower capacitor electrode that includes a first and second barrier layer, as claimed. Specifically, layer (12) of Onishi may be formed of TiN as claimed in applicants' claim 3.

Similarly, Jiang et al also shows a related structure in Fig. 8, which is directly analogous to applicants' Fig. 1 embodiment, and which also employs first and second barrier films formed over the contact plug (46), and where the barrier films are specifically designed to prevent unwanted oxygen diffusion, as in the instant invention. For example, bottom capacitor electrode

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layer (48b) in Jiang may be formed of composite layers containing Iridium or Iridium oxide layers, as claimed in claims 5 and 10. Jiang also teaches the use of TiN layers as part of the lower electrode.

As applicants admit in the specification at page 2, the use of a titanium film for the lower part of the first barrier film, (as claimed in claims 4 and 9), is known in the prior art. In addition, applicants also admit on page two of the specification that the use of three barrier films, as claimed in claim 6, is known, for example, with the use of a third layer of Pt.

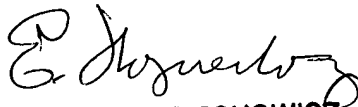
Since both references are concerned with the same problems of unwanted diffusion between contacts, as is the invention, they are properly combinable, and all of the claimed features would be within the scope of these references.

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3. Any inquiry concerning this communication or earlier communications from the examiner should be directed to E. Wojciechowicz whose telephone number is (703) 308-4898.

EW:ew

September 30, 2001


EDWARD WOJCIECHOWICZ
PRIMARY EXAMINER
GROUP 2500